



# Resource Ramblings

Volume 9 Number 3 Winter 2010-11

## Wind Cave National Park Resource Management News Briefs

This Issue Edited by Dan Roddy, Biologist (Wildlife Management)

This edition is dealing with issues, concerns and happenings in resources management with the bulk of articles dealing with what took place in 2010 and what we plan to do in 2011 on the wildlife side of things.



*All photos in this edition are NPS photos unless otherwise stated*

There are many articles in this issue that have been shortened in length to keep this version to a reasonable amount of pages. If the reader has an interest in additional details of a particular subject matter, please contact the author.

Contributors to this edition: Barb Muenchau and Duane Weber (Biological Science Technician-Wildlife), Dan Roddy (Biologist), Joel Tigner Batworks, LLC, Marc Ohms (Physical Science Technician) and Beth Burkhart (Botanist)

### Table of Contents:

| <u>Articles:</u>                                                                                                                   | <u>Page:</u> |
|------------------------------------------------------------------------------------------------------------------------------------|--------------|
| • Managing Wildlife, where do you draw the line?                                                                                   | 2            |
| • Implementation of the Elk Management Plan                                                                                        | 2            |
| • New phase of elk research begins                                                                                                 | 3            |
| • Why No bison capture (roundup) in 2010?                                                                                          | 4            |
| • Will there be a bison capture in October 2011?                                                                                   | 4            |
| • What happened to all of the porcupines in the park?                                                                              | 4            |
| • Bat Hibernacula Surveys – Wind Cave & Coyote Cave                                                                                | 4            |
| • 2010 Christmas Bird Count: Above average number of species                                                                       | 5            |
| • Grouse lek surveys completed                                                                                                     | 5            |
| • Off Road Breeding Bird Surveys                                                                                                   | 6            |
| • Active Raptor Nests in 2010:                                                                                                     | 6            |
| • NEW PROJECT IN 2011 “Climate Change and Avian Migration Phenology in the Great Plains”                                           | 7            |
| • Nightjar Survey (2nd annual)                                                                                                     | 7            |
| • 2010 Pronghorn Survey:                                                                                                           | 8            |
| • Black-footed ferret re-introduction program update                                                                               | 8            |
| • Ferret Survival: Protecting their habitat and their food source (prairie dogs) is the key                                        | 9            |
| • Plague is Near or is it Here?                                                                                                    | 9            |
| • NEW PROJECT IN 2011: “Effects of deltamethrin on the tiger salamander ( <i>Ambystoma mavortium</i> ) at Wind Cave National Park” | 10           |
| • Update on Chronic Wasting Disease (CWD). It’s still out there                                                                    | 11           |
| • Precipitation: 2010 Report                                                                                                       | 11           |
| • Mercury Sampling at Wind Cave National Park                                                                                      | 12           |
| • Updating Wind Cave National Park “Vegetation Map”                                                                                | 13           |

## Managing Wildlife, where do you draw the line?

By Dan Roddy

Wildlife Management in a National Park is a never ending struggle. Do you leave the wildlife alone and “let nature take its course” or intervene and try to manage the wildlife or maybe just the large ungulates in the park such as bison and elk (the big grazers that can have some of the most impact on forage availability), or do you go as far as trying to manage the smaller wildlife species such as prairie dogs, ferrets, fish and fleas, mountain pine beetles or bats in the attic or ants in the office, or woodrats in the cave. I think you get the picture. Where do you draw the line?

Our 2006 Management Policies, Chapter 4.4.2 states that “Whenever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species”. In this section of policies you can also find a number of situations where you may, under certain conditions, intervene to manage individuals or populations of wildlife.

The author realizes we cannot operate in a vacuum. We must step in and manage wildlife under certain situations such as for human health concerns (fleas and plague) or to protect/promote endangered species (black-footed ferret) or to avoid over-utilization of our prairie (by bison or elk). Beyond these examples, we walk a fine line of deciding where to draw the line.

**This Issue:** In the wildlife management division of the park we have gone through a number of phases over the past 10 years. After a base increase for the establishment of a resource management program in FY 2000, enough resource management staff became available to begin focusing on a wildlife survey/inventory phase during the early-mid 2000’s. Making use of the inventory data (knowing what wildlife species were present in the park) we preceded into a “plan writing” phase through the mid-late 2000’s. We completed management plans for prairie dogs, reintroduction of ferrets, bison and finally our elk management plan. We are now in an implementation phase of the management plans as well as the long term monitoring of resources in the park. **The main focus of this edition is the implementation of the plans and the results of the monitoring of park wildlife resources.**

## Implementation of the Elk Management Plan

By Dan Roddy and Duane Weber

Work on the Elk Management Plan and Environmental Impact Statement began in 2004. The Record of Decision (ROD) was signed December 2009. The target number of elk to be maintained in the park was established at 232–475. The preferred alternative selected to help reach this population goal was to modify the park fence, mainly in the southwestern corner but also along the west boundary and possibly the east and north boundary (if there are willing adjacent landowners). The modifications incorporate moveable sections of fence (drop down elk gates) that can be raised to 7’ or lowered to 4’. The ability to raise or lower the fence when necessary provides flexibility so the park can control the movement of elk into or out of the park at certain times of the year.

[See the summer 2010, Volume 8 issue for complete article on the fence construction by Duane Weber].



Boundary fence re-construction



Part of the re-construction was to add 8 drop down elk gates on the boundary fence south of Highway 385. Photo was taken of a double elk gate (left gate in upright position at approximately 7’ / right gate in the down position at a height of <4’).

The park has been working with Dr. Glen Sargeant (U.S. Geological Survey, Jamestown, ND) for the past 5 years on an elk movement study. Through his work, the park now has a clearer picture of when the elk movement occurs on the western half of the park. There are daily movements but in general the larger movement out of the park by some elk occurs from mid-March thru May when the elk cows leave to have their calves outside the park. The movement back into the park with their calves begins around mid-August.

Aware of these movement patterns the park will make sure the elk gates are down in early March to provide easy access for the elk to move beyond the park boundaries. The elk gates will remain down (at the 4' height) until late July/early August, when the elk will begin their movement back into the park. At that time, the elk gates will be raised to the 7' height which is the same height as the rest of the boundary fence. This should stop the seasonal movement of elk back into the park. Keeping the transient elk out should reduce the number of elk supported by the parks' prairie grasslands as well as provide recreational opportunities for the public beyond the park boundaries.

Will the fence modification (drop down elk gates) work? We will soon find out. Currently, the 8 gates on the southwestern corner of the park (south of Highway 385) are in the down position and ready to be used by elk leaving the park this spring. Will the elk find a way back into the park this fall? Time will tell!

How will we know if the fence is doing its job and keeping elk from getting back into the park? That's where the next phase of elk research comes in. Keep reading!

## **New phase of elk research begins**

**By Duane Weber and Dan Roddy**

Two-three years ago, when it came time for our Washington level project review committee to evaluate our new funding proposal for elk research the proposal was met with some resistance. The evaluators suggested that this work had already been done at the park but when it was all said and done we ended up being praised for wanting to do this follow up work. We were rewarded with the research project being highly ranked and moving forward to be funded. We need the science to make sound management decisions

when it comes time to evaluate the success of the modified boundary fence aka elk gates.

The park has the movement data from the earlier study (2005-2010), the emphasis for this phase of work is to provide the data/science during the implementation of the Elk Management Plan. By placing GPS collars on 34 different cow elk (elk capture took place Feb 17-19, 2011) we will be able to collect information necessary to adapt our management decisions.

Adaptive management as described in Appendix C of the Elk Management Plan / EIS is "based upon a continuing, iterative process of applying management actions, monitoring consequences, evaluating monitoring results against objectives, adjusting management actions.....".

We will know if the fence is keeping elk beyond the park boundaries by tracking the elk wearing the collars. If we need to adapt our approach we will have the science behind us for making modifications to our preferred alternative. As stated in the ROD for the Elk Management Plan/EIS, if we are not within 5% of the established upper limit of 475 elk (app. 500) within 2 years then the adaptive management actions will be implemented. The additional actions become a little messier for the park and the elk. Round-up and live ship to a slaughter house or round-up and euthanize the elk in the park with incineration of carcasses.

As you can tell, the science is extremely important towards future management decisions for the park and the elk.

Let's hope the fence modification works for the elk on the western half of the park. The elk on the eastern half of the park is a different story. We'll discuss the plan for them in a future edition.

Current elk numbers in the park this winter (2010-11) has been estimated to be 750-800



**Large herd of elk  
on eastern half of park**

**Photo by Charlie Baker**



**Why No bison capture (roundup) in 2010?** After our last bison capture operation in 2009 we realized our numbers (app. 320) were lower than what we had anticipated. We are permitting the herd to build back up to approximately 400 adults.

Currently, before this bison calving season, bison numbers were estimated to be 340-350 with 40-50 of those animals being calves from last year.

We realize the above numbers don't add up because we figure in an annual bison mortality average of 20-25 animals and we do not maintain an exact count of our bison herd. In 2010 there were 16 mortalities that we were aware of but certainly there were more than that out on the landscape.



**Will there be a bison capture in October 2011?** No, we have already decided to wait at least one more year before removing yearlings from the herd. The next full blown bison capture will not take place until at least the fall of 2012. That date could change if the Casey Ranch (currently owned by The Conservation Fund) is purchased by the Federal Government and our bison herd is allowed to expand onto that property.

**What happened to all of the porcupines in the park?** Porcupines, which seemed to be commonplace in the park as well as the southern Black Hills 6-12 years ago, now seem to be non-existent. They used to be found in the vicinity of the visitor center, picnic grounds, cottonwood exclosure along NPS 6, roadkills along Highway 385 as well as other roads throughout the Black Hills.



Porcupine on northern end of park

Their populations are known to be cyclic but we are not sure what the reason (s) is for their apparent disappearance from the park. Please let resource management staff know, if you are lucky enough to see a porcupine or recent evidence of them being in the park. We'd like to hear about em!

## Bat Hibernacula Surveys – Wind Cave & Coyote Cave

By Joel Tigner Batworks, LLC, Rapid City, SD

Bat hibernacula surveys were conducted at two sites in the park. These surveys were conducted utilizing visual observance and (where possible) identification of bats in areas that had demonstrated bat use in previous winter observations. Efforts were made to minimize disturbance in areas where bats were observed. No bats were handled and only bats displaying reliable, unique identifying characteristics were identified to species.

### WIND CAVE – 02/08/11

Three bats were observed during the survey, all tucked into crevices. All were in close proximity to the Post Office section of the cave and located within the main passage. Two species were identified: a single *Myotis ciliolabrum* (Western Small-footed Myotis) and a single *Myotis septentrionalis* (Northern Myotis). The third bat was located in a position that blocked the view of the tragus although ear length suggested this was also *M. septentrionalis*.

Participating in the survey: Marc Ohms, Dan Roddy, Rod Horrocks, Lee-Grey Boze, Joel Tigner of Batworks, LLC.

### COYOTE CAVE – 02/09/11

A total of 14 bats were observed during the survey with all observed in crevices or sheltered dome-like locations. Two species were identified, *Myotis septentrionalis* (Northern Myotis) and *Myotis ciliolabrum* (Western Small-footed Myotis). All observed bats were of the genus *Myotis*.

Participating in the survey: Marc Ohms, Dan Roddy, Lee-Grey Boze, Brad Phillips (USFS), Joel Tigner, Batworks, LLC.

Thanks to Marc Ohms for coordinating the hibernacula surveys with Joel Tigner and the rest of the park staff.

### 2010 Christmas Bird Count Above average number of species By Barb Muenchau

The “fifteenth” annual Christmas Bird Count was held in the Park and surrounding area on December 12, 2010. Temperatures ranged from 6 to 39 degrees Fahrenheit, with winds 4-6mph.



**Northern Harrier – second time in 15 years observed on the Christmas Bird Count**

The 6 survey groups (8 participants) counted **1000 total birds** including **35 species**.

The 15 year average for total birds counted is 1122, and the average number of species observed is 32. For a total list of species and number of birds observed stop by and talk with Barb, Duane or Dan.

Some interesting / unusual observations:

- Two new species were observed this year; Blue Jay (2) and Red-winged Blackbird (28)
- Tied for 5<sup>th</sup> highest species count (35) highest was 41
- 2<sup>nd</sup> highest count of Gray Jays = 8 (highest 9)

- 2<sup>nd</sup> highest count of Black-billed Magpies = 26 (highest = 64)
- Single observations included American Tree Sparrow, House Finch, Northern Harrier, Black-backed woodpecker and Mountain Bluebird
- No owls were located – first time since 2002
- Two mountain lions were observed in the Mixing Circle area of the Park
- Coyote observed carrying a live prairie dog

### Grouse lek surveys completed By Dan Roddy

Sharp-tailed grouse lek (dancing ground) surveys are conducted in April to obtain an accurate count of birds using the leks. This information is used in the development of population trend data for Sharp-tailed grouse within the park.



**Male Sharp-tailed grouse strutting/dancing on the lek**

The Sharp-tailed grouse numbers appear to have been steadily declining in the park since 2007 (Figure 1) when the number of grouse observed using the leks was 57. Since the spring of 2007 the numbers counted have gone from 57 to 16-18 to 17 to 14 in 2010. Although, if the number of grouse observed this winter (Dec 2010-Feb 2011) is any indication of things to come this spring the numbers of grouse should be increasing once again in the park. As many as 36 were observed in one flock this past December as well as 52 sighted in the park during our Christmas Bird Count.



**Figure 1.** Number of grouse observed on leks located in the southern and eastern parts of the park appears to be declining since 2007.

| Date | Max # Birds | Southern end of Park | Eastern half of Park | Comments                                  |
|------|-------------|----------------------|----------------------|-------------------------------------------|
| 1999 | 91          | 37                   | 54                   | Active leks (3 southern / 4 or 5 eastern) |
| 2004 | 56          | 19                   | 37                   | Active leks (2 southern / 4 eastern)      |
| 2007 | 57          | 08                   | 49                   | Active leks (1 southern / 4 eastern)      |
| 2008 | 16-18       | 00                   | 16-18                | Active leks (0 southern / 2 eastern)      |
| 2009 | 17          | 00                   | 17                   | Active leks (0 southern / 4 eastern)      |
| 2010 | 14          | 00                   | 14                   | Active leks (0 southern / 3 eastern)      |

## Off Road Breeding Bird Surveys

By Barb Muenchau



Male Black-backed woodpecker Photo by Mike Laycock

Five off-road breeding bird surveys were conducted during the month of June in 2010. The five transects are established along the Rankin Ridge Trail, Centennial Trail (through the burn), Coldbrook Canyon Trail, Wind Cave Canyon Trail and the Beaver Creek Trail. This is the twelfth year the off-road surveys have been conducted. Of the 5 transects, Beaver Creek had the highest numbers of species (39) with Coldbrook at 36 species, Wind Cave Canyon at 35

species, Centennial trail at 27 species and Rankin Ridge at 26 species. The highest number of total birds were observed on the Coldbrook Canyon transect (351) with Wind Cave Canyon at 296 birds, Beaver Creek at 274 birds, and Centennial trail and Rankin Ridge both having 264 birds each.

## Active Raptor Nests in 2010:

By Dan Roddy

The following raptor nests were active (adult incubating eggs, nestlings, fledglings, etc.).

| 2010 | 2009 | Species         |
|------|------|-----------------|
| 03   | 01   | Golden eagle    |
| 05   | 6-7  | Red-tailed hawk |
| 01   | 00   | Prairie falcon  |
| 2-4  | 04   | Burrowing owl   |



## Burrowing owl on prairie dog colony

Active nests are difficult to compare for trend data from year to year due to a lack of time and staff to do a thorough job of searching for new or visiting known nests to determine level of activity. Staff was not able to locate active nests this year for Turkey Vulture, Goshawk, Cooper's Hawk, Merlin, Great-horned Owl, Long-eared Owl or Northern saw-whet Owl.



Active Golden eagle nest with one nestling

## **NEW PROJECT IN 2011: “Climate Change and Avian Migration Phenology in the Great Plains”**

The following information was taken from the Scope of Work provided to the park’s research coordinator

The project will be carried out cooperatively among the Northern Great Plains I&M Network (NGPN), the Southern Plains I&M Network, and the Rocky Mountain Bird Observatory (RMBO). Although the initial focus would be on National Park Service units within this region such as Wind Cave and Badlands NP’s, part of the intent is to further develop scientifically rigorous methods that could be applied to an expanded set of study sites including wildlife refuges and other lands of interest for the purpose of evaluating the prototype monitoring scheme.

### **Background and Objectives:**

Grassland bird species are among the most rapidly declining birds in North America and climate change is one of the major threats facing these species (North American Bird Conservation Initiative, U.S. Committee, 2009). Fifty five percent of the grassland species are showing significant declines (North American Bird Conservation Initiative, U.S. Committee, 2009). There has been mounting evidence over the past several years that the timing of migration in birds, as well as the onset of breeding, has been advancing in response to changing temperatures (reviewed by Root et al. 2003, Crick 2004, Parmesan 2006). Of particular concern is when the timing of breeding is no longer synchronized with the seasonal abundance of food on which successful breeding depends (Visser and Both 2005, Parmesan 2006). Although there is substantial evidence for a general shift in migration phenology, there is considerable variation in the observed response of individual species. Marra et al. (2005) found that on average, migratory birds arrived one day earlier for every 1° C increase in temperature. Understanding these changes in bird migration patterns will be a critical component of understanding changes in bird populations within the Great Plains and elsewhere.

The primary objective of this new study is to estimate the arrival times for grassland birds of conservation concern that migrate along the Central Flyway. RMBO will specifically look for the three grassland bird species (burrowing owl, ferruginous hawk and long-billed curlew) along with other vulnerable

grassland species that have been identified as species of concern by both the Plains and Prairie Potholes Landscape Conservation Cooperatives (LCC).

To estimate the arrival times at each site, NGPN will deploy acoustic monitoring devices at each survey location. To confirm territory occupancy, RMBO will conduct periodic point count surveys at each survey location using their protocol from approximately mid-March to mid-June of 2011.

At each survey site, bird observations, distance to observations, and time interval of each observation will be recorded at each point count station during 5 minute surveys.

Collaborators on the project will discuss how to determine the most effective approaches for the analyses of the various datasets. Examples of these datasets may include eBird, BBS, and Vegetation Index data.

## **Nightjar Survey (2<sup>nd</sup> annual)** **By Duane Weber and Barb Muenchau**

No No No we weren’t looking for jars at night we were looking for members of the Nightjar family of birds which in the Black Hills consists of mainly the Common Poorwill and the Common Nighthawk.

In 2010 the nightjar survey routes were completed on June 23<sup>rd</sup> by Duane and Barb with each taking one of the established routes in the park. Both ran a 10 mile long roadside, nighttime survey that consisted of 10 stops each for a total of 20 stops in the park.



**Common Nighthawk in flight**

### Results of 2010 surveys:

Detected 10 Common poorwills on 7 stops.

Detected 15 Common Nighthawks on 12 stops. There were two stops where both poorwills and nightjars were detected.

17 of the 20 stops yielded at least one nightjar.

Routes are nationally coordinated by "The Center for Conservation Biology at the college of William and Mary and Virginia Commonwealth University."

[www.ccb-wm.org/nightjar](http://www.ccb-wm.org/nightjar).

### 2010 Pronghorn Survey:

By Duane Weber



**Pronghorn buck observing 2 does during fall rut**

The pronghorn survey was conducted on Thursday, September 16, 2010 with the assistance of 12 observers.

Total count of pronghorn = 124 An increase of 10-12 animals as compared to the last count run in 2007.

Through the summer, field observations had noted a lack of fawns for the number of does detected. This perception held true during this count with only 3 fawns counted during the park wide effort. This compares to a more typical number of 12-20 fawns. A very cool wet spring and a coyote population that has rebounded from the mange kill of the early-mid 2000's may both be contributing factors to poor fawn survival.

2010 population estimate = 120-130 Pronghorn

### Black-footed ferret re-introduction program update

By Barb Muenchau

Fall spotlight surveys took place from September 20-24<sup>th</sup> and October 18-21<sup>st</sup>, 2010 for a total of 6 days. A total of 716 person hours were spent by 29 participants. During this 6 night period, 23 ferrets were captured: 10 kits (6.4) and 13 adults (7.6), with 11-17 other individual sightings (unable to trap). This brought our post fall survey BFF population estimate to a minimum of 34-40 BFF's.



**Black-footed ferret**

On November 4, 2010 twelve ferrets from the Ferret Conservation Center in northern Colorado were released in two colonies in the eastern portion of the Park, bringing the Parks estimated BFF population to a minimum of 46-52 ferrets. Story covering the release of the ferrets made the front page of Inside NPS.

An interesting note: during the 2010 spring spotlight survey, one of the original captive bred females was identified for the first time since her release in 2007. She had managed to remain hidden from spotlight surveyors for 5 surveys.

Total hours spent during 2010 surveys (spring and fall spotlight surveys and snow tracking) = 916.5 person hours. **Minimum number of BFF's** believed to be in the Park = **46-52 BFF's** (39 of these were identified during the year, 7-13 unable to capture/identify).

During the **2009 fall spotlight surveys** the minimum number of ferrets was determined to be **16-18**.

During the **2008 fall spotlight surveys** the minimum number of ferrets was determined to be **26-29**.



Keep in mind these numbers are minimum numbers of ferrets, plus the fact we are getting better at refining our techniques and knowing more about the best time to be out there on the prairie looking for the endangered black-footed ferrets. Hopefully the numbers of ferrets will continue to rise in 2011.

## **Ferret Survival: Protecting their habitat and their food source (prairie dogs) is the key**

**By Dan Roddy**

You probably realize that without prairie dogs and the habitat they create there would be no ferrets in Wind Cave NP or elsewhere in the western U.S. Without the burrows dug by the prairie dogs (where the ferrets spend most of their lives resting, hiding, raising their young) and without the prairie dogs themselves (>90% of a ferret diet is made up of prairie dogs) there would be no ferrets in the wild.



**Black-tailed prairie dog**

What is the park doing to make sure it provides the best opportunity for ferret survival? It is protecting its prairie dogs as much as possible. Keep in mind that many other wildlife species in the park depend on or make use of the habitat created by prairie dogs i.e. burrowing owls, tiger salamanders, badgers, pronghorn, golden eagles, etc. but the endangered ferrets are the focal point of this article.

To make sure the 2600 acres of active prairie dogs in the park are protected, resource management staff as well as staff from other divisions, other parks and our Washington office in Fort Collins went on the offensive in 2008. The park decided it would try to protect the habitat and food source of the ferret by protecting as much of the 2600 acres of prairie dogs as it could with an insecticide known as Deltamethrin or more commonly referred to as Deltadust. Why an

insecticide? Is there a problem with the prairie dogs? Why do they need protected? What is the park protecting them from?

You'll need to move on to the next article for the answers to these questions and more.

## **Plague is Near or is it Here?**

**By Dan Roddy**

Sylvatic plague (wildlife version of plague) unfortunately found its way into South Dakota in the mid-2000's and was discovered in the Conata Basin (Buffalo Gap National Grasslands) on May 13, 2008. That same year prairie dog die-offs were reported within 15-20 miles of the park.

In an effort to protect prairie dogs and black-footed ferrets (both highly susceptible to plague) Conata Basin, Badlands National Park (adjacent to Conata Basin) and Wind Cave NP began "dusting" prairie dog burrows in 2008 with an insecticide known as Deltamethrin. The white powder (dust) is sprayed into the prairie dog burrow so that the prairie dogs using the burrow will come in contact with the insecticide dust which in turn will kill the fleas on the prairie dogs as well as control fleas in the burrows. The fleas are the problem. They are the carriers of the plague bacteria not the prairie dogs. To control the plague bacteria you must control the flea loads in the prairie dog burrows. Over the past 3 years, mainly park resource staff as well as others, has been spraying insecticide into prairie dog burrows to reduce the flea loads in the burrows. We are confident, as are others using the insecticide, that it works to kill fleas and reduce the risk of plague.



**Park resource staff applying Deltamethrin (delta dust) into prairie dog burrow**

If the insecticide works, are we risk free from plague? By no means are we risk free of plague at Wind Cave NP. With limited resources, the park has only been able to treat roughly a 1/3 of the prairie dog acres. The cost to the park in 2010 was approximately \$25,000 to treat roughly 900 acres. The other 2/3's remain untreated and unprotected from a plague event.

To put the impacts from plague in perspective, at Conata Basin a total of 17,916 acres of prairie dogs have been impacted by plague since 2008. The consequences of plague developing within a small number of acres (2,600) such as Wind Cave NP would probably be catastrophic and could all but eliminate our prairie dogs and in turn those species that rely on them. This could all happen in a short period of time.

Do we know whether plague has found its way to the park? Through monitoring efforts within the prairie dog colonies we have not noticed any major changes that could be contributed to plague. Ferrets are one of the first wildlife species to suffer from plague. Managers will notice a sharp decline in a ferret population occupying a prairie dog colony when plague is active. As noted earlier in this document, the ferrets in the park seem to be doing well and increasing in numbers.

Wind Cave National Park has never experienced a known plague epizootic, though active plague has been found within 15-20 miles of the Park.

Unfortunately, current flea/plague research being conducted by Dr. Hugh Britten and Erica Mize (University of South Dakota) following the nested PCR protocol of Hanson et.al (2007), indicates the presence of the *Yersinia pestis pla* gene within the Park. In 2009, 13 out of 83 fleas collected from 3 prairie dog colonies tested positive for the *Yersinia pestis pla* gene. In 2010, 12 out of 580 fleas collected from 3 colonies tested positive for the *Yersinia pestis pla* gene. Approximately 149 fleas remain to be tested, and additional fleas will be collected during 2011. The researcher suggests the results indicate the presence of enzootic (in the background, low levels) sylvatic plague in Wind Cave National Park (Britten & Mize 2011).

**AM IMPORTANT QUESTION:** Does Deltamethrin (the insecticide used to kill the fleas and protect the prairie dogs and ferrets from plague) harm/kill other things that come in contact with the

dust? We know it kills the fleas living on the prairie dogs as well as the fleas living in the burrows if the fleas come in contact with the dust, but how about the other animals that live in the prairie dog burrows where the dust is sprayed? Are there effects to them?

One species of concern to the park is the Tiger salamander (*Ambystoma mavortium*).



**Tiger salamander found near Bison Flats pond**

The Tiger salamanders are especially abundant at the Bison Flats prairie dog town at Wind Cave National Park (Kolbe et al. 2002), which surrounds a seasonal wetland used as a breeding locality by salamanders living in the prairie dog burrows. This prairie dog town is a reintroduction area for the black-footed ferret and has been treated with deltamethrin for the past three years. Approximately 90 acres surrounding the seasonal wetland within the prairie dog colony has been left untreated as a tiger salamander refuge. Depending on movements, tiger salamanders within the Bison Flats colony may come in direct contact with the insecticide, and their abundance at the site makes it a suitable location to study the effects of deltamethrin on vertebrates.

To help us answer the questions/concerns dealing with the possible impacts to Tiger salamanders from our dusting efforts, the park has entered into a Cooperative Agreement with Black Hills State University.

### **NEW PROJECT IN 2011: “Effects of deltamethrin on the tiger salamander (*Ambystoma mavortium*) at Wind Cave National Park”**

Dr. Brian Smith and his graduate student Joseph McAllister plan to spend the next 2 years figuring out the answers dealing with the questions surrounding the

Tiger salamander. Their study, *Effects of deltamethrin on the tiger salamander (Ambystoma mavortium) at Wind Cave National Park*, will officially begin April 2011.

Results of this study will give us a better understanding of the effects of deltamethrin on salamanders allowing the Park to make an informed decision regarding maintaining the salamander refuge or dusting the area with deltamethrin. If salamanders do not appear to be affected by deltamethrin, the Park may decide to dust the refuge area for plague prevention.



Tiger salamander found near Bison Flats pond 3-17-2010

## Update on Chronic Wasting Disease (CWD). It's still out there

By Barb Muenchau and Duane Weber

Even though you may hear less and less about the disease, the park and its resource management staff continue to collect samples (mainly Duane), send them in for analysis and report results. Over the past year, with the assistance of resource protection staff, there were 20 cervids (deer and/or elk) that were tested for CWD. Five animals tested positive for the disease.

### 2010 Results:

Elk=17 tested (4 positive, 11 negative, 2 pending)  
Mule deer = 3 tested (1 positive, 2 negative)

### To date (March 1998 – December 2010):

244 Cervids have been tested (2 tests pending)

Elk = 94 tested (25 positive, 67 Negative, 2 pend)  
Mule deer = 116 tested (8 positive, 108 negative)  
White-tailed deer = 34 tested (1 positive, 33 neg.)

Total = 34 positives / 208 negative / 02 pending

## PRECIPITATION: 2010 Report

By Barbara Muenchau,

Wind Cave National Park staff members have been collecting precipitation data since rain gauges were first installed in 1940. Precipitation was documented on a monthly basis from 1940 to 1946, then only sporadically from 1947 to August, 1951. Since then, continuous monthly precipitation data has been recorded, giving us fifty-nine years of information.

As would be expected in the Great Plains, the majority of our precipitation falls from April to September, with the greatest amount being received in May. Figure 1 represents the 59 year monthly precipitation averages received in the Park compared with the monthly precipitation received in 2010. The least amount of precipitation is typically received in January.

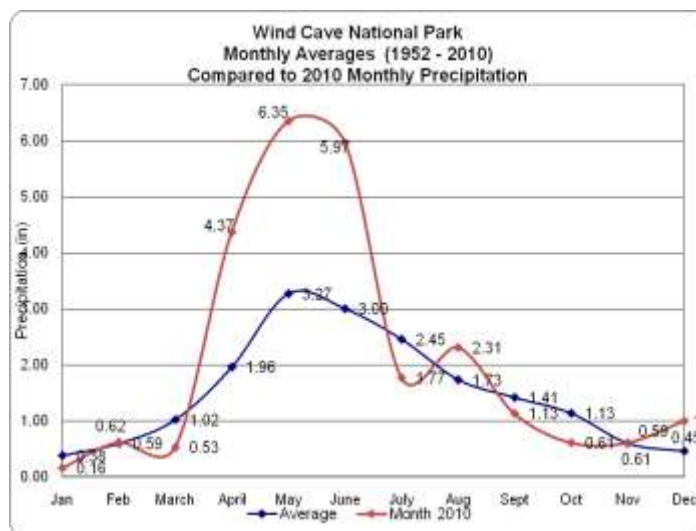
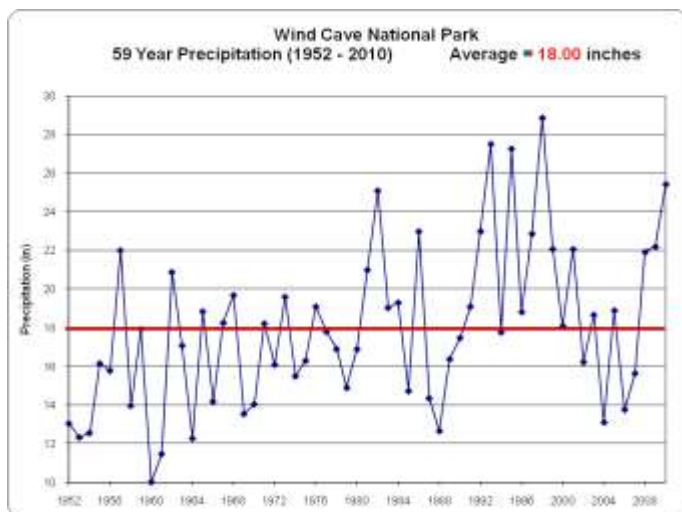


Figure 1 The 59 year monthly precipitation averages compared with 2010 monthly precipitation received

As can be seen in Figure 2, Wind Cave annual precipitation can fluctuate greatly as is typical in the Great Plains. In the last 59 years, precipitation has ranged from a low of 10.02" in 1960, to a high of 28.87" in 1998. The Park 59 year **annual average** is **18.00 inches**. The Park received **25.43 inches** of precipitation in the **2010** calendar year.





**Figure 2 1952-2010 annual precipitation  
(59 year average = 18.00)**

This precipitation data, along with the daily high/low temperature and snowfall measurements, is the official Wind Cave weather submitted to the National Weather Service. The Park also has extensive monthly temperature data. Resource Management staff is in the process of compiling this data.

## Mercury Sampling at Wind Cave National Park

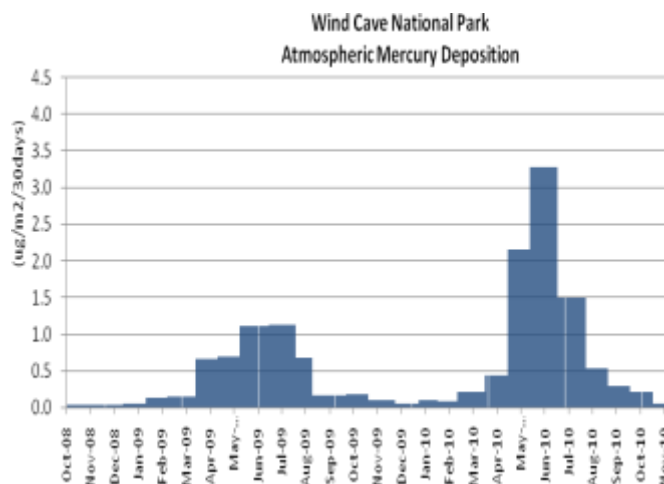
By Marc Ohms

In early 2009 Dr. James Stone from the South Dakota School of Mines and Technology, with funding from the NPS, installed a mercury sampler at the Elk Mountain air quality station. The sampler collects precipitation, and once a month the sample is sent to the lab for testing. This is a part of a larger mercury monitoring network encompassing South Dakota and surrounding western states. The project was slated to end this month but an extension to the end of the summer has been provided.

Mercury is a naturally occurring element in our environment. It enters the atmosphere as a result of natural events, such as volcanic eruptions; or manmade activities, such as the combustion of fossil fuels, especially coal. Mercury is persistent, bio-accumulative, and toxic. Because of these properties, mercury poses potential human health risks, especially for pregnant women, developing fetuses, and young children. Mercury is also toxic to wildlife, especially fish, birds, and fur-bearing mammals that consume organisms contaminated with mercury. Human exposure to mercury occurs almost exclusively through

fish consumption. Because of potential health risks, nearly all states in the United States currently have some form of fish advisory for their water bodies, most of which are based on high levels of mercury. (For South Dakota see- <http://doh.sd.gov/fish/default.aspx>)

Currently there are no mercury advisories in Western South Dakota, but this is largely due to a lack of sampling, not a lack of mercury. This project will hopefully fill some of the information gaps within the region. During the mid-1970's the Cheyenne River had a high mercury level advisory, but has since improved and the advisory has been lifted. Due to the increase of coal-fired power plants in Wyoming over the past few years we have seen a definite increase in our mercury levels (see graph below).



| Site               | µg/m²/yr |
|--------------------|----------|
| Badlands NP        | 3.43     |
| Devils Tower NP    | 6.57     |
| Eagle Butte, SD    | 7.49     |
| Scotts Bluff NM    | 7.92     |
| Teddy Roosevelt NP | 5.82     |
| Wind Cave NP       | 6.70     |

**Mean mercury deposition rates for all sites through November 2010.**

### References:

Stone, James. 2011. 2010 Project Summary Report- Assessment of Atmospheric Mercury Deposition at Select Northern Great Plains National Parks Service Locations. Unpublished report to parks, 6p.

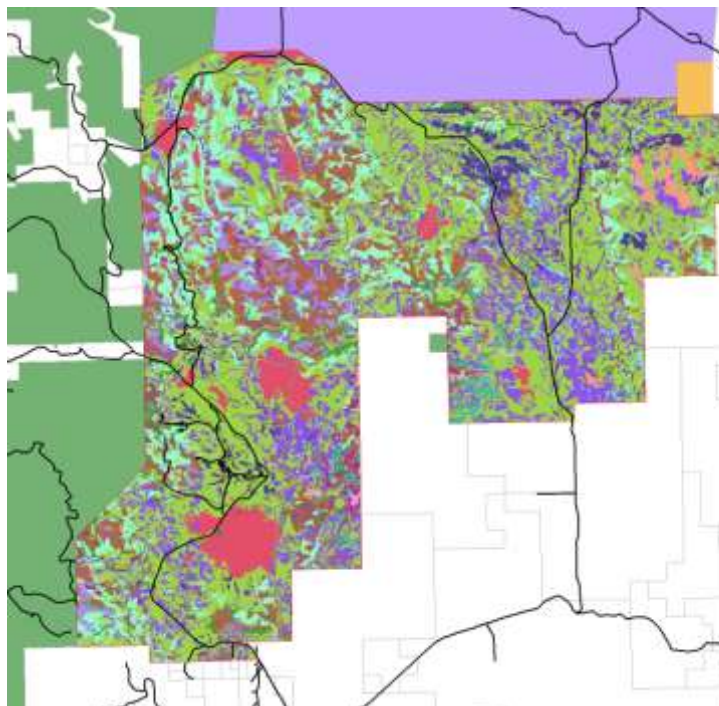
## Updating Wind Cave National Park “Vegetation Map”

By Beth Burkhart

**What is a “vegetation map” and why would Wind Cave National Park want one?** Firstly, “vegetation map” is a shortcut label to put on a complex set of outputs. More accurately called a vegetation mapping project, the output products include a detailed vegetation report, vegetation plot data, a dichotomous (two choices at every step) vegetation key, a photo-interpretation key, a digital vegetation map, and accuracy assessment data/analysis. The primary objective of a vegetation mapping project is to obtain high quality, standardized maps and associated datasets of vegetation and other land cover. These products allow Wind Cave NP staff to better:

- conserve plant biodiversity,
- manage invasive species,
- manage outbreaks of insects and disease,
- understand wildlife/habitat relationships,
- understand wildland and prescribed fire effects.

**Figure 1.** One representation of the Wind Cave NP 1999 “vegetation map” – a kaleidoscope of colors (each color representing a different map class of vegetation) that is useless at this scale but reflects a wealth of data available at smaller scales for analyses of park activities/projects interacting with vegetation.



### How did Wind Cave NP get a “vegetation map”?

The Inventory and Monitoring Program of the NPS was created in 1991 to provide park managers with critical information on natural resources. To address part of this mission, NPS contracted with the US Geological Survey - Biological Resources Division to implement a multi-year project producing vegetation maps for 235 national parks. USGS-BRD developed various work contracts with other government and private agencies to make the project a reality.

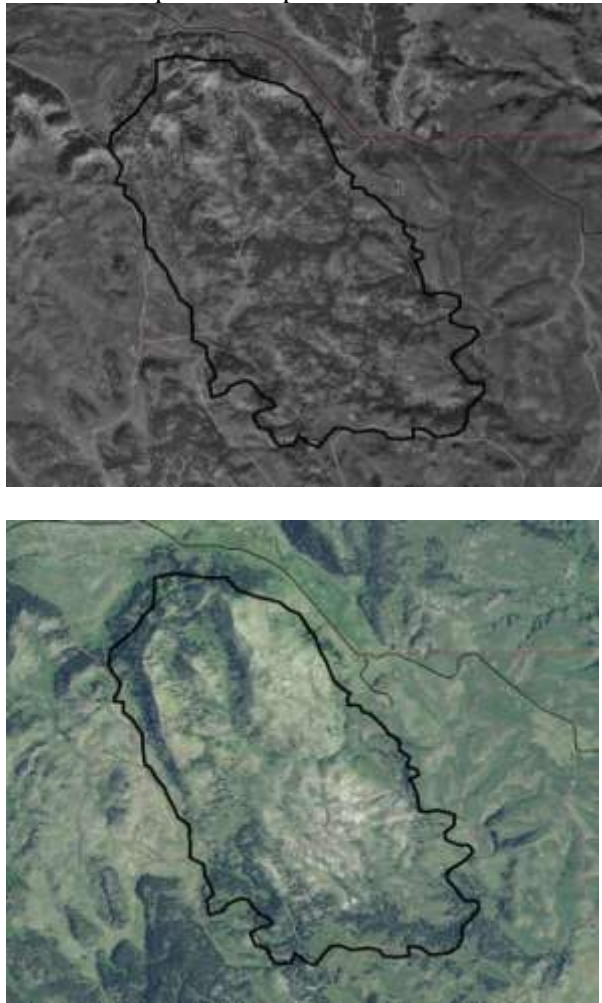
In the case of Wind Cave NP, USGS contracted with the Bureau of Reclamation’s Remote Sensing and Geographic Information Group and The Nature Conservancy to map vegetation occurring in and around the park in a project that was completed in 1999 (Figure 1). Vegetation map classes were determined through extensive field reconnaissance, data collection and analysis in accordance with the National Vegetation Classification System. As a result, the vegetation types identified in Wind Cave NP mapping products can be related to vegetation types throughout the country (as well as to types in places close by such as Jewel Cave National Monument and Mount Rushmore National Memorial).

The vegetation map was created initially by interpretation of 1997, 1:12,000 scale color infrared aerial photography (0.5 hectare minimum mapping unit). All vegetation and land-use information was transferred to USGS digital orthophoto quarter-quads using a combination of on-screen digitizing and scanning techniques. Arc/Info software was used throughout the project for digitizing, scanning, transforming, registering, and plotting the interpreted data. Overall map accuracy for the mapping effort was assessed at 73% (this may seem low, but is an average of accuracy including large polygons/types identified with higher accuracy and small polygon/types identified with lower accuracy).

### How does a “vegetation map” get out of date?

Vegetation is dynamic and always changing. Perennial plants, including trees, shrubs, and herbaceous species, can take a significant amount of time to establish and grow. However, they are constantly reacting and adjusting to environmental (e.g. drought) and ecological (e.g. intense herbivory/grazing) conditions. Annual plants are able to react/adjust more quickly. In addition to small scale adjustments, there are ecological processes that can cause landscape-scale vegetation changes in a short period of time, such as fire and mountain pine beetle epidemic. (Figure 2)

**Figure 2.** Perimeter of 2001 Highland Creek Wildfire on 1990s black and white aerial photography (left) and 2010 black and white aerial photography (right). Notice vegetation change from fire – substantial reduction in ponderosa pine cover.



**How is Wind Cave NP updating its “vegetation map”?** To update the 1999 Wind Cave NP “vegetation map”, a photo-interpretation exercise similar to that of the original vegetation map project was completed by Wind Cave NP botany/GIS staff using 2010 color aerial photography. The original “vegetation map” was overlaid with ca. 1990s black and white aerial photography and examined for calibration purposes (the original color infrared photography was not available). This calibration investigating what imagery signatures were identified with what map classes on the old map was completed in order that identification decisions in the current process would emulate the original process as closely as possible.

After calibration, the original “vegetation map” was overlaid with 2010 color aerial photography and changes in map classes analyzed and digitized at 1:5,000 scale. Given the limitations of the current process (i.e., non-professional photo-interpreters, color photography rather than infrared), it was decided to start with documenting the most substantial changes in vegetation. For example, this included changes from pine forest to grassland (or vice versa) or significant changes in tree density. Most of this change is the result of prescribed or wildfire (causing decreases in tree density) or lack of fire (causing increases in tree density) in the last decade (Figure 3).

Wind Cave NP personnel know from their time out in the park that significant changes have occurred to some of the park’s vegetation between 1999 and 2010 from disturbances like fire, lack of fire (allowing ponderosa pine regeneration), and changes in numbers and locations (e.g. prairie dog colonies) of wildlife species. Since the NPS Inventory and Monitoring vegetation mapping project is still working on providing some parks their first vegetation maps, a return to redo the Wind Cave NP “vegetation map” is not on any future horizon. Wind Cave NP staff decided in the fall of 2010 to embark on a project to update the park “vegetation map” using available imagery and park staff expertise (GIS as well as botanical) because an accurate “vegetation map” is so important to the park in making appropriate management decisions.



**Figure 3.** NPS Fire effects monitoring photographs from 2006 Centennial Prescribed Burn – prefire photo (top) and 2 years post-fire (bottom). Notice decrease in ponderosa pine density. (Photographs courtesy of Dan Swanson, NPS Fire Ecologist)



The 2010 update product is not as rigorous as the original “vegetation map” for several reasons. Firstly, the color infrared photography used in the original 1999 “vegetation map” allowed for more detailed photo interpretation of different vegetation classes due to the additional spectra available. Secondly, Wind Cave NP staff lack the level of photo-interpretation experience of those remote sensing professionals who conducted the original 1999 photo-interpretation. Thirdly, the interpretation of 2010 photography has not been ground-truthed yet, so the accuracy level of 2010 map class determinations is currently unknown. But we have made a start!

The Wind Cave NP “vegetation map” updating project continues from the digitizing work accomplished during the winter 2010-2011. Color infrared photography from 2010 was recently acquired and the updates that were made based on color photography will be reviewed/revised for best results. The Northern Great Plains Inventory and Monitoring Network recently decided that it will acquire QuickBird imagery of several network parks in 2011, including Wind Cave NP. This color infrared photography will be even better than the 2010 color infrared photography so will trigger another review/revision process next fall. Wind Cave NP personnel are getting more experience with photo-interpretation through these revisions and results should improve in consistency. Lastly, a plan for field reconnaissance is being developed for summer 2011 to investigate the virtual changes documented relative to vegetation on the ground – confirming map class changes and determining vegetation type changes (in synchrony with the National Vegetation Classification System).

The 1999 mapping products won’t be discarded because they provide a snapshot in time of Wind Cave NP vegetation in 1999. It may take a couple years for Wind Cave NP staff to complete an update of Wind Cave NP vegetation mapping products, even with focusing on areas of greatest vegetation change (note: all information from the 1999 vegetation mapping products will be brought forward in the new map products unless there is a good reason to make a change). But in 2011 or 2012, Wind Cave NP will have a new, most current “vegetation map” to provide a basis for park planning and management, including the upcoming Wind Cave NP General Management Plan. Wind Cave NP vegetation staff are working hard to make this question irrelevant relative to vegetation resources – if you don’t know what you have, how can you manage it?!